

LOWER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Cheney Lake Water Quality Impairment: Siltation

Subbasin: North Fork Ninnescah

County: Reno, Stafford, Pratt, Kingman, and Sedgwick

HUC 8: 11030014

HUC 11 (HUC 14): **010** (030, 040, 050, 060, 070, 080, 090)
020 (010, 020, 030, 040, 050)
030 (010, 020, 030, 040, 050)

Drainage Area: Approximately 880.6 square miles.

Conservation Pool: Area = 7,663 acres, Maximum Depth = 13 meters

Designated Uses: Primary Contact Recreation; Expected Aquatic Life Support; Drinking Water; Industrial Water Supply Use; Food Procurement

1998 303d Listing: Table 4 - Water Quality Limited Lakes

Impaired Use: Primary Contact Recreation

Water Quality Standard: Surface waters shall be free, at all times, from the harmful effects of substances that originate from artificial sources of pollution and that produce any public health hazard, nuisance condition, or impairment of a designated use. (KAR 28-16-28e (1)).

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 303d: Not Supporting Primary Contact Recreation

Monitoring Sites: Station 017001 in Cheney Lake.

Period of Record Used: Eight surveys during 1975-1999. Special 319 Project.
US Geological Survey study on sediment (August 1997)

Current Condition: Cheney Lake has high, inorganic turbidity and high levels of siltation. The lake is very open to the wind, causing sediment to resuspend. The KDHE monitoring site is at a deep water station that has low colloidal particles. Suspended solids concentrations at this

station average 16.06 mg/l, with a range of 3.00 to 62.00 mg/l. It is generally desired to maintain total suspended solid concentrations below 100 mg/l. The average turbidity is 24.5 (formazin turbidity unit), and the average transparency (Secchi Disc depth) is 0.398 m 1.3 feet).

Based on analysis of sediment data from the US Geological Survey, approximately 235 acre-feet of sediment are deposited per year. Sedimentation and sediment particle size are not uniformly dispersed throughout the lake. Sand particles were deposited upstream, and clay and silt particles were widely distributed. Ninety percent of the deposition is out-of-channel, and ten percent is in-channel. The amount of sediment deposition within the conservation pool was 104,217 tons (8,000 acre-feet); this is 15 percent of the design criteria.

Interim Endpoints of Water Quality (Implied Load Capacity) at Cheney Lake over 2005 - 2009:

In order to improve the quality of the water column, the endpoint for Cheney Lake will be an increase in average transparency as measured by Secchi Disc of 0.61 meters (2 feet)

This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 1998 Section 303d list.

Seasonal variation in the endpoint is not established by this TMDL. This endpoint can be reached as a result of expected reductions in loading from the various sources in the watershed resulting from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of the endpoints indicate loads are within the loading capacity of the stream, water quality standards are attained and full support of the designated uses of the stream has been restored, therefore the narrative water quality standard pertaining to suspended solids would be attained.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: Land use coverage analysis indicates that 72.6% of the watershed is cropland, and 24.3 % is grassland. Erosion from cropland is the most likely source of siltation. Water erosion occurs from two of the three main soil associations in the watershed (Renfrow-Vernon and Farnum-Shallabarger soils).

Contributing Runoff: The watershed has an average soil permeability of 5.1 inches/hour according to NRCS STATSGO data base. Runoff would be produced from storms one to two hours in duration, having a recurrence interval up to twenty five years and storms of three hours in duration, having a recurrence interval of twenty-five years. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. Generally, 13 percent of the watershed would generate runoff under dryer conditions or smaller storms. Moderate or wet conditions or larger storms would see runoff contributed from most of the watershed.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the siltation impairment must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current wasteload allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers.

Nonpoint Sources: Siltation loading comes predominantly from nonpoint sources. Given the runoff characteristics of the watershed, overland runoff can easily carry sediment into the streams. The Load Allocation will be a 10% reduction in average sediment load or 210 acre-feet per year.

Defined Margin of Safety: The margin of safety will account for the uncertainty in suspended solids reaching the conservation pool and its resulting transparency, hence, the margin of safety will be defined as a maximum suspended solid concentration in the lake water column of 50 mg/l.

State Water Plan Implementation Priority: Because Cheney Lake is a federal reservoir, and to take advantage of placing nutrient and sediment BMPs within the watershed concurrently, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the North Fork Ninnescah (HUC 8: 11030014) with a priority ranking of 7 (High Priority for restoration).

Priority HUC 11s: The watershed is within HUC 11s (010, 020, 030).

5. IMPLEMENTATION

Desired Implementation Activities

There is a very good potential that agricultural best management practices will allow full use support to take place in Cheney Lake. Many of these best management practices are currently being put into practice through the local, 319 lake protection project. Despite such potential improvements, turbidity may still remain a problem due to the wind-mixed conditions. Some of the recommended agricultural practices are as follows:

1. Maintain conservation tillage and contour farming to minimize cropland erosion.
2. Install grass buffer strips along streams.
3. Reduce activities within riparian areas.

Implementation Programs Guidance

Nonpoint Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.

Water Resource Cost Share Program - SCC

- a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.

Nonpoint Source Pollution Control Program - SCC

- a. Provide sediment control practices to minimize erosion and sediment and nutrient transport.

Riparian Protection Program - SCC

- a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.
- b. Develop riparian restoration projects.

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate agricultural producers on sediment, nutrient, and pasture management.
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff.

Time frame for Implementation: Pollutant reduction practices should be installed within the priority subwatersheds during the years 2001-2005, with minor follow up implementation, including other subwatersheds over 2005-2009.

Targeted Participants: Primary participants for implementation will be agricultural producers within the drainage of the lake. Initial work in 2005 should include local assessments by conservation district personnel and county extension agents to locate within the lake drainage:

1. Total row crop acreage
2. Cultivation alongside lake

Milestone for 2005: The year 2005 marks the mid-point of the ten year implementation window for the watershed. At that point in time, sampled data from Cheney Lake should indicate

evidence of reduced total suspended solid levels in the conservation pool elevations relative to the conditions seen over 1975-1999.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State Extension.

Reasonable Assurances:

Authorities: The following authorities may be used to direct activities in the watershed to reduce pollutants.

1. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.
2. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.
3. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.
4. K.S.A. 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.
5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*.
6. The *Kansas Water Plan* and the Lower Arkansas Basin Plan provide the guidance to state agencies to coordinate programs intent on protecting water quality and to target those programs to geographic areas of the state for high priority in implementation.

Funding: The State Water Plan Fund, annually generates \$16-18 million and is the primary funding mechanism for implementing water quality protection and pollutant reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund to programs supporting water quality protection. This watershed and its TMDL is a High Priority consideration.

Effectiveness: Sediment control has been proven effective through conservation tillage, contour farming and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation farming within the watersheds cited in this TMDL.

6. MONITORING

Additional data, to establish sediment loading and further determine mean summer lake trophic condition, would be of value prior to 2005. Further sampling and evaluation should occur once before 2005 and twice between 2005 and 2010.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Lower Arkansas Basin were held March 9 in Wichita, April 26 in Wichita and Hutchinson, and April 27 in Arkansas City and Medicine Lodge. An active Internet Web site was established at <http://www.kdhe.state.ks.us/tmdl/> to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Lower Arkansas Basin.

Public Hearing: A Public Hearing on the TMDLs of the Lower Arkansas Basin was held in Wichita on June 1, 2000.

Basin Advisory Committee: The Lower Arkansas Basin Advisory Committee met to discuss the TMDLs in the basin on September 27, November 8, 1999; January 13, 2000; March 9, 2000; and June 1, 2000.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Sedgwick County Technical Advisory Group: August 8, October 14, and November 15, 1999 and January 20, April 27, and May 25, 2000.
Agriculture: January 12, February 2 and 29, 2000
Environmental: March 9, 2000
Conservation Districts: November 22, 1999
Industry: December 15, 1999, January 13, February 9 and 22, 2000
Local Environmental Protection Groups: September 30, November 2, December 16, 1999

Milestone Evaluation: In 2005, evaluation will be made as to the degree of impairment which has occurred within the drainage and current condition of Cheney Lake. Subsequent decisions will be made regarding implementation approach, follow up of additional implementation and implementation in the non-priority subwatersheds.

Consideration for 303d Delisting: Cheney Lake will be evaluated for delisting under Section 303d, based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 303d list. Should modifications be made to the applicable sediment criterion during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted

accordingly.

Incorporation into Continuing Planning Process, Water Quality Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2002 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2001-2005.